UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

ACTION MEMORANDUM

DATE: July 21, 2005

SUBJECT: Action Memorandum for a Non-Time-Critical Removal Action at the Terminal 117 Early Action Area, Lower Duwamish Waterway Superfund Site, Seattle, Washington
Site ID - WA0002329803

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I. PURPOSE

The purpose of this Action Memorandum is to document the U.S. Environmental Protection Agency's (EPA) selection of the Non-Time-Critical Removal Action (NTCRA) described herein for the Terminal 117 (T-117) Early Action Area (EAA) of the Lower Duwamish Waterway Superfund Site (LDW), Seattle, Washington. The removal action for contaminated sediments and adjacent bank soils at the T-117 EAA is projected to be conducted by the Port of Seattle (Port) and the City of Seattle (City) pursuant to an Administrative Order on Consent (AOC) issued by EPA. The removal action objectives for the T-117 EAA Removal are to:

1) Reduce the concentrations of contaminants in surface sediment (biological active zone, 10 cm) within the removal area boundary to below the Washington State Sediment Quality Standard (SQS) for polychlorinated biphenyls (PCBs)(12 mg/kg OC).

2) Ensure that any remaining bank soil contamination at T-117 will not be released into the waterway and result in exposure to human and ecological receptors above protective levels established by removal and capping of PCB contaminated soils.

EPA has determined that: 1) the conditions at the T-117 EAA may present an imminent and substantial endangerment to public health, welfare, or the environment; and, 2) the T-117 EAA conditions meet the criteria of the National Contingency Plan (NCP), 40 CFR Section 300.415, for a removal action. An administrative record has been prepared for this removal action. No obligation of CERCLA funds is necessary as this action should be conducted by responsible parties.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

This is a non-time-critical removal action for sediments and nearshore soils at the T-117 EAA of the Lower Duwamish Waterway (LDW) Superfund Site. The LDW site was listed on the National Priorities List (NPL), pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, in 2001. The focus of the removal action is on contaminated intertidal and subtidal sediments adjacent to the T-117 property. Source control work above these sediments (e.g., bank and as needed upland area) will also be completed at the T-117 property. The removal action will take place in the sediments out to the navigation channel, along the bank above the sediments, within an upland area between the bank and the paved uplands, and if necessary a portion of the paved upland area.

1. Evaluation of Historical Sources

Historical sources of sediment contamination were primarily from oil that was contaminated with PCBs and delivered by Seattle City Light as fuel oil for Duwamish Manufacturing Company in the 1970's. In addition to PCBs, Ecology is also considering a former local drum/barrel reconditioning operation as a possible historic source of other contaminants, as well as potential sources of PCBs and other contaminants that include a local marina and small boatyard and local stormwater runoff. The Washington State Department of Ecology (Ecology) is the lead for source control at the LDW site. Ecology has issued a Source Control Action Plan for T-117, which identifies past and present potential sources and the proposed means of managing source control (Ecology 2005).

2. Physical Location

T-117 is located on the west side of the LDW from approximately River Mile 3.5 to River Mile 3.7, as measured from the southern tip of Harbor Island. It is part of the LDW Superfund Site. See Figure 1 for a location map of T-117 and Figure 2 for the removal area covered by this Action Memorandum.

T-117 is bordered by the South Park Marina to the north and the Boeing South Park Facility to the south. To the west, T-117 is bordered by the former Basin Oil Company on the west side of Dallas Ave South. The City has the adjacent street right-of-way, including Dallas Ave South (between the former Basin Oil property and T-117). Residential properties are in the immediate vicinity of T-117, to the west along 16th Ave South and 17th Ave South.

3. Site Characteristics

a. Development

The T-117 property, at 8700 Dallas Ave South in Seattle, Washington, covers approximately 2.9 acres and is owned, in its entirety, by the Port. The T-117 EAA generally consists of the upland bank to the navigation channel (+13 to -9 ft MLLW). The shoreline features of the T-117 EAA include a bank that contains asphalt and other debris, and a wooden bulkhead in portions of the site (Windward, 2005).

b. Existing Habitat Conditions

The T-117 EAA is characterized by gently sloping intertidal and subtidal habitat (mudflat) below a very steep to vertical vegetated bank laden with asphalt deposits and other debris. The intertidal habitat of the T-117 EAA extends from the toe of the riprap bank, around +5 ft MLLW, to a depth of approximately -4 ft MLLW. The T-117 intertidal habitat includes more than 43,000 ft^2 (4000 m^2) of gently sloping fine-grained sediment. This area is potential habitat for benthic communities and may be utilized for feeding by juvenile salmonids.

c. Endangered and Threatened Species

Five species exist in the LDW site that is listed under the Endangered Species Act as candidate species, threatened species, endangered species, or species of concern: Chinook salmon, river lamprey, bull trout, bald eagle and peregrine falcon. Of the five species, salmon, bull trout and bald eagle commonly use the LDW and are more likely to have exposure to sediments than the other species. Coho (silver) salmon are also listed as a State "species of interest". Use by peregrine falcon and river lamprey have been noted as rare.

B. Release or threatened release into the environment of a hazardous substance(s) (Windward, 2005)

Based on an evaluation of historical sediment and soil data at T-117 and the Phase 1 scoping phase risk assessment for the LDW Superfund site, PCBs were identified as the primary chemical risk driver for this action. Source control activities focus upon ongoing sources of PCBs and other contaminants to reduce the potential for recontamination.

As part of data collection for the T-117 Engineering Evaluation/Cost Analysis (EE/CA):

- Fifty-seven individual surface sediment samples were analyzed for PCB Aroclors.
- Fourteen of those 57 surface sediment samples, analyzed for PCBs, were also analyzed for semivolatile organics and volatile organics.
- Twelve of those 57 surface sediment samples analyzed for PCBs were also analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc).
- One surface sediment sample near the South Park Marina was analyzed for tributyl tin (TBT).

Table 1 summarizes the total PCB results for soil and sediment samples. Table 2 presents the detected metals and semivolatile data that exceeded the SMS criteria for soil and sediments.

As regulatory criteria for this removal action, EPA is using the Washington State Sediment Management Standards (SMS) to identify and designate sediments that may have adverse effects on aquatic organisms. The standards establish a sediment quality goal for Washington State. For PCBs, the SMS promulgates a higher clean-up screening level (CSL) and a lower sediment quality standard (SQS).

The surface sediment sampling data showed a spatial trend of PCB concentrations decreasing from the bank (max 10,000 ppm-OC, OC = organo carbon normalized amount of chemical available to benthic's) out towards the navigation channel (max 270 ppm-OC). Sediment samples with PCB concentrations above the PCB CSL were found within 100 ft of the top of the bank. PCB concentrations were generally higher and the frequency of CSL exceedences was greater in the northern portion of the EAA relative to the southern portion. Two surface sediment locations within the proposed cleanup boundary had exceedences of the SMS standards for polycyclic aromatic hydrocarbons (PAHs). The two locations with PAH exceedences also contained PCBs above the CSL.

There were no exceedences of the SQS for any other chemical constituent in surface sediment.

Twenty-one subsurface sediment cores, most of which were divided into six or seven sampling intervals, were analyzed for PCBs. Selected cores were also analyzed for the full suite of SMS chemicals. Similar to the surface data, the subsurface data showed a spatial trend of PCB concentrations that decreased from near the bank to the navigation channel. Higher concentrations exceeding the CSL were found in the northern part of the EAA.

Because the bank soils are a potential source of contaminants to sediments, fourteen bank soil boring locations were sampled for PCBs, of which six were also analyzed for PAHs. Two drainage ditch samples were also analyzed for the full suite of SMS chemicals. Results were compared to the SMS. PCB concentrations in soil borings typically exceeded the CSL in the shallower samples, although exceedances occasionally occurred to 9 ft deep. Much lower concentrations occurred in deeper soils. Soil samples from the south drainage ditch also exceeded the CSL for PCBs, benzoic acid, and benzyl alcohol. Ten additional shoreline soil boring locations and eight locations in the southern drainage ditch were recently sampled for PCBs to further characterize the extent of upland contamination. This data is not available at the time of this memorandum.

Two catch basins were sampled for soils and analyzed for the full suite of SMS chemicals. PCBs, bis(2-ethylhexyl)phthalate, silver, pentachlorophenol, and benzyl alcohol concentrations in some catch basin soils exceeded the CSL. Two other catch basins were also analyzed for PCBs and found to have SQS exceedances. All culverts and catch basins on T-117 will be thoroughly cleaned prior to initiation of the removal action as part of the upland source control measures.

Groundwater samples were initially collected from four monitoring wells immediately adjacent to the shoreline. Samples were analyzed for PCBs, PAHs, and volatile organics compounds. No Non Aqueous Phase Liquid (NAPL) was observed during a low tide monitoring event. No PCBs, PAHs, or other chemicals were detected in monitoring well groundwater samples. Two additional wells were subsequently installed on the north end of the site and all shoreline wells were sampled for PCBs. All site wells were checked for the presence of NAPL around high tide. Additional groundwater monitoring has been completed as part of a recent supplemental sampling event. Data from the additional groundwater monitoring will be evaluated by the EPA to further inform the design of the NTCRA.

Water samples from three seeps along the shoreline were also collected. Copper, zinc, chromium and bis(2-ethylhexyl)phthalate were detected in at least one sample. In addition, PCBs were detected in one sample. The sample with detected PCBs was centrifuged to remove particulates and reanalyzed. No PCBs were detected in the centrifuged sample. Since the seep collection method could entrain surface sediments, the centrifuge results suggest the PCBs were associated with entrained sediments rather than associated with the seep water. Recent groundwater sampling in this area will be used to confirm this interpretation.

The soil and sediment chemistry results demonstrate that sediment within the T-117 EAA may impact benthic organisms based on comparison to the SMS CSL. In addition, because T-117 is within an active urban waterway with an adjacent operating neighboring marina, there is a potential for these contaminated sediments to be disturbed by boat traffic, leading to their further release into the water column in the vicinity of T-117. Additionally, the bank and a part of the adjacent upland along the T-117 shoreline are highly contaminated with PCBs (max 10,000 ppm-oc) and must be removed to prevent ongoing contamination to the LDW.

The portion of the T-117 EAA that warrants removal action consists of a total surface area of approximately 3 acres of contaminated marine sediments and soils. PCBs are the main contaminant of concern. PCBs are "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14). A detailed discussion of the analysis of PCBs in soils and sediments at the T-117 EAA is included in the T-117 EE/CA.

The presence of hazardous substances at T-117, or the past, present, or potential future migration of hazardous substances currently located at or emanating from T-117, constitute actual and/or threatened "releases" as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

C. NPL status

The T-117 EAA is located within the boundaries of the LDW Superfund site, which was listed on the NPL on September 13, 2001.

D. Maps, pictures, and other graphic representations

Relevant figures and tables are attached to this memorandum.

E. Other Actions

Previous actions

In 2000, pursuant to a CERCLA AOC, an upland time-critical-removal action was completed by the Port to remove PCB-contaminated soil in the upland part of the former Malarkey Asphalt Company ponding area to a level of 25 ppm dry weight. The removal area and other exposed soil areas within T-117 were capped with asphalt. The Port purchased this property from Malarkey just prior to this action. Malarkey purchased the property from Duwamish Manufacturing.

In 1996, pursuant to a CERCLA AOC, an emergency time-critical removal action was conducted by the Malarkey Asphalt Corporation to remove 23 above ground storage tanks, remove visibly stained soils and to clean out a sump from the upland area. The removal was completed in accordance with the AOC Scope of Work.

F. Other current actions

The City of Seattle, City Light (SCL) is planning to install electric utility poles at T-117 that will carry electric distribution lines across the waterway from T-117 to the Jorgensen Forge bank on the East side of the waterway, to replace structures (now removed) that were previously located in the waterway. The schedule for this work has not been decided, but all electrical work will be scheduled to avoid construction or other conflicts with the T-117 Early Action.

In a separate action, the City of Seattle Public Utilities (SPU) also completed an interim cleanup in 2004-2005 to contain PCBs present in the street right-of-way and adjacent yards located near T-117. The interim cleanup action included grading and paving portions of Dallas Avenue South, South Donovan Street, and 17th Ave South, as well as removing PCB contaminated soil with 3 private properties along 17th Ave South and Dallas Ave South. A temporary collection and treatment system was installed to manage storm water runoff from the roadways. All runoff is currently discharged to the combined sewer on South Donovan Street under a discharge authorization with King County Industrial Waste. The treatment system was removed in April 2005 after testing confirmed that runoff samples met King County's discharge limits. Runoff is stored in (5) 18,000 gallon tanks and released at a controlled rate to the combined sewer (Geissinger, 2005).

Final cleanup of the public rights-of-way near T-117 is anticipated to occur in 2007. Interim actions have protected the public from exposure to the PCBs present in the right-of-ways. Seattle Public Utilities will coordinate the Final cleanup so that it does not impact the T-117 removal action work schedule.

G. State and Local Authorities

The Washington Department of Ecology, Washington Department of Fish and Wildlife, and the Washington Department of Health have participated in reviewing and commenting on documents associated with the T-117 EAA including those specific to this action.

H. Potential for continued State/local response

The removal action in the T-117 EAA will be conducted under CERCLA authority, with the state being given the opportunity to provide timely comments on project design documents and work plans. Coordination efforts with state and local authorities will continue throughout the project. In addition, coordination with the community advisory group (Duwamish River Clean up Coalition) for the Lower Duwamish Superfund Site will continue throughout the project.

III THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

Individuals working or residing near T-117 are not likely to come in direct contact with sediment or water from T-117, however, the T-117 EAA sediments are not fenced, so public access is possible. However, a steep bank makes public access difficult. Tribal Net-Fishers may contact sediment incidentally upon net retrieval, and may also make incidental contact with surface water and sediment suspended in surface water. Although there are no public access points on T-117, the South Park Marina and a public boat launch north of the marina are the closest recreational boating points to the T-117 EAA.

At the T-117 EAA, direct and indirect exposure for human health risks includes dermal exposure to contaminated sediment and ingestion of contaminated fish and shellfish . PCBs are a known human carcinogen and are known to accumulate in the tissue of fish and shellfish. Screening PCB risks for the LDW have been quantified in the Scoping Phase Risk Assessment for the LDW Superfund Site.

B. Threats to the Environment

At the T-117 EAA, ecological receptors primarily include fish and benthic dwelling organisms. Benthic organisms may be exposed to contaminants from ingestion of contaminated sediment, direct contact with contaminated sediment, and contact with interstitial water associated with contaminated sediment. Bottom feeding fish may also be exposed to contaminants from contact with and ingestion of contaminated sediment. The contaminant of concern (PCBs) found in sediments in the T-117 EAA exceed the State's CSL criteria indicating the potential for impacts to benthic organisms. Clams were also found in the intertidal mudflat

of T-117. Tissue concentrations were found to be elevated when compared to clam tissue found along the rest of the LDW.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances at or from the T-117 EAA may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

This non-time-critical removal action for contaminated sediments at the T-117 EAA is projected to be implemented by the Port and the City pursuant to an Administrative Order on Consent (AOC) issued by EPA. The Port and the City prepared an Engineering Evaluation Cost Analysis (EE/CA) for the T-117 EAA. The EE/CA identified two alternatives to address the high levels of PCBs in the EAA:

1) Highly contaminated sediments from the submerged zone would be dredged and the final dredged surface backfilled to re-establish the original bottom contours. Highly contaminated soils from the mudflat would be excavated and the post excavated surface backfilled with clean materials. Highly contaminated soils from the bank would be excavated and rebuilt with a protective cap. Highly contaminated soils from the unpaved upland area immediately adjacent to the bank would be removed and capped with protective substrate.

2) Same as alternative 1) for the bank, adjacent unpaved upland area and the mudflat. Sediments in the submerged zone would only be capped.

B. Clean-up Boundary

The clean-up boundary proposed in the T-117 EE/CA by the Port and City is conditionally acceptable to the EPA as a basis to move forward to the design phase (Figure 2). Should additional data indicate that further upland area soils adjacent to the bank are highly contaminated with PCBs, that portion of the pavement and soils will be removed and a protective fill layer will be added as appropriate to meet removal action objectives prior to any placement of cap material. Specifications of this protective fill layer will be determined later in design. It is expected that the final removal action boundary may be subject to variations during the design phase of the project and during the implementation of the removal response.

C. Clean-up Goals

The goal of this removal action is to address the most highly contaminated material on the bank, adjacent upland and adjacent sediments and to cleanup the intertidal/mudflat soils to the SMS SQS of 12 ppm-oc for PCBs. The goal for the removal of the bank and unpaved upland areas is to prevent recontamination to the mudflat soils and submerged sediments. Following the completion of the removal action, the PCB concentrations in the post capped or post back-filled

surface sediment within the cleanup boundary will be less than or equal to the State Management Standards SQS value of 12 ppm OC, since clean cap and back fill material will be used. Prior to back fill or capping the sediments in the EAA, additional measures may be proposed for residual PCB concentrations that remain above the SQS in post dredge EAA surface sediments. These additional measures will be further defined following the removal action and after taking post excavation and dredge samples. The cleanup of the bank will be engineered such that any remaining post excavation PCB concentrations above the SQS will not be a source to the sediments. The post excavation soil surface and post-dredge sediment surface will be sampled and data submitted to the agencies prior to bank cap placement or sediment backfill.

Table 3 compares the proposed two alternatives. Both alternatives would require disposal of the excavated and dredged material at an approved TSCA or Subtitle D landfill depending on the concentration of the PCBs in the material. A No Action alternative was not evaluated in the EE/CA because the no-action alternative would not have been protective of human health and the environment.

Through an evaluation of effectiveness, implement ability, and costs, Alternative 1 is selected by EPA selected as the preferred alternative. Although slightly less expensive, Alternative 2 was not selected because greater reduction of PCB concentrations in the environment would occur with Alternative 1.

D. Proposed action description

1. Excavation of the Upland Bank

The bank removal includes the bank and intertidal area as well as the unpaved upland between the bank and the asphalt. The excavation will occur during low tide to minimize effects on the waterway. The upland excavation will be to an approximate elevation of +14 ft MLLW, and then extend horizontally to the shoreline to a point sufficient to meet removal action objectives. Impacted soils, creosote-treated timbers and piles, asphalt, debris, and other material will be removed. When encountered during excavation, material that meets the regulatory criteria of disposal in a Toxic Substance Control Act (TSCA) hazardous substance landfill (PCBs > 50 mg/kg dry weight (dw)) will not be left in the bank. Upland material exposed by the excavation will then be covered by an isolation cap.

Additional explorations and studies have been recently completed to refine the depth and extent of removal, as well as the nature and extent of backfill and capping (if required). Considerations to determine the depth of the bank excavation will include slope stability, potential for recontamination of remaining material to the waterway and the post excavation PCB concentrations in the bank. Decisions on the depth of the removal action will be made during the actual excavation depending on post excavation PCB concentrations. Data from the additional explorations and studies, which will be submitted to the EPA after full validation, may change the configuration of the removal action boundary for this area.

The conceptual cap presented in the T-117 EE/CA presently covers the full extent of the excavated bank slope, and then extends into the mudflat to provide for long-term integrity of the

cap structure at the toe of the bank. The cap would be designed in accordance with applicable or relevant and appropriate requirements (ARARs) and applicable EPA guidance (Palermo, 1998).

The northern upland area of the EAA will be set up as a separate removal management area for the excavated material that will require disposal in a TSCA Hazardous Substance landfill.

Catch basin 5 will be removed as part of the action and replaced with a structure better suited for retaining sediment and periodic cleaning.

a. Bank Alignment

In general, the final alignment of the bank excavation and capping will be determined during design to avoid undermining the pavement cap adjacent to the removal boundary, and to avoid any net loss of intertidal habitat acreage. However, should the recent supplemental data (expected to be received summer 2005) indicate high contamination along the bank area, additional contaminated areas and soil underlying the pavement will be removed and an appropriate protective layer will be added to the proposed cap design. For the purposes of the EE/CA, the +10 ft MLLW elevation contour of the existing grade was generally used as the control line for maintaining intertidal habitat acreage.

b. South Park Marina Bank Alignment

The northern part of the bank removal includes an area within the adjacent operating South Park Marina. Within the South Park Marina, the final grade of the cap will end prior to the shoreline so as to maintain navigation depths in the marina at the planned -8 ft MLLW. The final bank alignment in the South Park Marina will be refined during design based on the bank removal.

Along a portion of the South Park Marina shoreline, the upland area may extend slightly (0-10 ft) into the interior of the paved area of T-117, where a short sheet pile retaining wall may be necessary to avoid encroachment of the cap into the marina.

The decision on whether to implement a sheet pile wall and the extent of the sheet pile wall will be made in the final design based on the design of the bank.

2. Excavation of Mudflat (Intertidal) Sediments

The T-117 mudflat zone contains moderately elevated PCB concentrations, less than those found in the upland-bank zone. Mudflat material with elevated PCBs will be removed until surface sediment is equal to, if not below, the state SMS SQS criteria. The mudflat excavation will start at the toe of the bank cut and progress out to the limit of the mudflat zone at the existing 0 ft MLLW contour. Most of the excavation should be completed while the tides are out and the mud is comparatively dry. Due to excavation depths, the most outward portion of the excavation (a strip 10-15 ft wide) will likely occur in 1-2 ft of water.

3. Dredging of Subtidal Sediments

The submerged zone typically contains comparatively lower PCB sediment concentrations. Dredging in the submerged zones will remove sediment with elevated PCBs to the SQS. Exposed sediment in the submerged zone will meet the State SMS SQS. The submerged zone dredging will start at the existing 0 ft MLLW contour. Dredge cuts will be finalized in the removal design. The volume of sediment to be removed from the submerged zone is estimated at 5,000-5,500 cy, with an average concentration of 1-2 mg/kg dw PCBs.

Once dredging is complete, the submerged and mudflat zones outside the South Park Marina will be backfilled to the pre-existing elevations to maintain a similar acreage and elevation of habitat. The backfill material will be imported, contaminant-free natural material to be determined in design. Prior to backfill, the post dredged material will be sampled. EPA will use this data to determine any follow-up actions that may be necessary as well as to determine whether the extent of backfill or capping that will be appropriate.

Dredging will occur only when in water work is approved by the Natural Resource Trustee Agencies to protect endangered salmonids (see section 8 below).

4. Disposal of Soils and Sediment

Excavated soils and dredged sediment will be disposed of in permitted landfills consistent with TSCA disposal requirements for bulk PCB remediation waste in 40 CFR 761.61 (a)(5)(i)(B) and state and local requirements. This section of the TSCA regulation allows disposal of dewatered soil and sediment with a PCB concentration of <50 ppm in some municipal solid waste and non municipal non-hazardous waste landfills. All disposal facilities will be approved by EPA prior to any disposal. Because hauling of material from the removal area to the disposal site would result in increased truck traffic on neighborhood streets, EPA will share draft truck transportation and safety plans with the South Park community. Community input and concerns will be evaluated by EPA in finalizing specific routes and schedules.

5. Performance of Long-term Monitoring and Recontamination Monitoring

Monitoring of the T-117 EAA final sediment surface, following the removal action, will be performed to assess attainment of removal action objectives, source control effectiveness, and occurrence of recontamination. Additionally, pre and post dredge monitoring will occur inside and outside of the removal boundary to assess the effects that the removal action may have had on the nearby sediments in the vicinity of T-117. Groundwater monitoring will be done post removal as a measure of source control effectiveness and the potential for recontamination. EPA will assess the performance of the bank cap no less frequently than every five years, to confirm that the bank cap is protective of human health and the environment.

6. Institutional Controls

Should hazardous substances be left onsite at concentrations that do not allow unlimited use and unrestricted access, institutional controls (e.g., real property controls and other non-

engineered controls) will be required in order to protect the effectiveness of the response actions selected in this Action Memorandum.

7. South Drainage Ditch

Surface soils with elevated PCBs will be excavated in the bank and upland portion of the south drainage ditch. The results of the supplemental sampling (to be received summer 2005), will determine the extent of excavation of soils in these areas.

8. Considerations for Removal Performance

The following factors are critical to the consideration of selection and development of the appropriate removal response action:

Sediment resuspension and/or recontamination during the removal action will be minimized by using best management practices (BMPs), to be developed in the design phase of the project by the contractor selected by the Port and the City. BMPs will comply with EPA performance objectives. BMPs will be required to ensure that disturbances to the environment during excavation and dredging will be kept to a minimum. BMPs will be shared with the public for their input and concerns.

Consistent with State Hydraulic Code Rules and Endangered Species Act (ESA) requirements, dredging and other in-water work cannot occur during identified "fish window" closure periods. The specific dates of these closures will be identified in consultation with the species listing agencies during the design phase of the project. Consistent with Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA), the selected alternative cannot prevent the use of the LDW as a working navigation channel.

The removal action will be coordinated with Tribal net-fishing in the LDW. Transportation and safety plans for excavated and dredged sediments and soils will be shared with the public. The construction of the removal action is expected to start in May 2006 to allow for work during daylight low-tide conditions. The final remedy for the LDW site is not known. However, removing a large mass of contaminated sediments from the waterway, while ensuring that the continued use of the waterway is not precluded, is consistent with the long-term remedial goal for the LDW.

9. Description of alternative technologies

The T-117 EE/CA discusses alternative technologies that were evaluated and screened out due to technical infeasibility.

10. Engineering Evaluation/Cost Analysis (EE/CA)

EPA prepared an EE/CA Approval Memorandum (2004) for this removal action. The Port and the City prepared an EE/CA, with EPA oversight pursuant to the AOC for the remedial investigation/feasibility study (RI/FS) for the LDW Superfund Site to which the Port and City are Respondents. The Boeing Company and King County are also Respondents to this RI/FS AOC, but did not participate in the preparation of the T-117 EE/CA. The EE/CA documents the

development and evaluation of removal action alternatives, and discusses the rationale for the recommended alternative. The EE/CA was made available for public comment from March 8 through April 7, 2005 and was revised following public comment on July 13, 2005. A copy of the Executive summary of the EE/CA is provided as an attachment. EPA prepared a response to public comments that is also included as an attachment to this memorandum. A copy of the EE/CA has been placed in the public information repositories for the LDW Site.

11. Applicable or relevant and appropriate requirements (ARARs)

All state and federal ARARs will be complied with. ARARs are summarized in Table 4. Applicable federal ARARs include TSCA 40 CFR 761, Clean Water Act Sections 311, 312, 401, 404; and the Endangered Species Act. Applicable state ARARs includes the Washington Model Toxics Control Act, Washington Sediment Management Standards and the Washington Hydraulics Code.

During design, and as a condition under Section 7 of the Endangered Species Act, EPA will consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFW). A Biological Assessment will be developed by the Port and the City and will be reviewed by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFW).

Off-site activities will comply with state and federal law, including the Off-Site Disposal Rule (40 CFR 300.440).

12. Project schedule

The schedule for this removal action will be contained in the Scope of Work for the anticipated AOC for the implementation of this NTCRA. The construction phase of this project is anticipated to start in May 2006.

13. Estimated Costs

Projected costs to implement this non-time-critical removal action are estimated not to exceed $5 million. Cost estimates for the proposed action are provided in Table 5.

EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If the action is delayed or not taken, contamination will continue to adversely affect the environment. Delayed action will increase environmental risks through prolonged exposure of people and the environment to PCBs, which are persistent bioaccumulative contaminants present in the sediments. Contaminated sediments in the T-117 EAA may be transported off site through natural and anthropogenic erosional processes, potentially increasing risks to the environment.

OUTSTANDING POLICY ISSUES

There are no outstanding policy issues.

COMMUNITY INVOLVEMENT

The EE/CA for the T-117 EAA was made available for public review and comment from March 8th through April 7th 2005. Notice of this comment period was published in the *Seattle Times* on March 8th. The comment period was also announced in a bilingual English/Spanish flyer mailed to about 3,500 addresses in February 2005. Additionally, a Superfund fact sheet announcing the comment period and summarizing the cleanup alternatives proposed in the EE/CA was mailed to almost 900 addresses in March 2005. That fact sheet was translated into Spanish, and 400 copies of the translation were sent to distribution points in March. The flyer and the fact sheet were posted on EPA's website, which also announced the comment period.

An Administrative Record was prepared for this action and notice of availability of that record was published in the Superfund fact sheet. The Administrative Record is available at EPA. The *Seattle Times*, the flyer, and the fact sheet all announced the availability of the EE/CA at EPA, Ecology, and the document repository near T-117.

On March 15, 2005, EPA held a public meeting to provide information and take public comments on the EE/CA. Well over 100 people attended the meeting. EPA received over 100 comments, either verbally at the meeting or in writing, during the public comment period. EPA provided a summary of responses to these comments in the Responsiveness Summary included as an attachment.

ENFORCEMENT

It is anticipated that this removal action will be implemented by the Port and the City pursuant to an AOC. These parties prepared the EE/CA pursuant to the LDW Superfund Site RI/FS AOC, and have begun AOC negotiations which should be completed in summer 2005.

RECOMMENDATION

This decision document represents the selected removal action for the T-117 EAA located within the LDW Superfund site, Seattle, Washington, developed in accordance with CERCLA as amended, and the NCP. This decision is based on the administrative record for the T-117 EAA.

Conditions at the T-117 EAA meet the NCP Section 300.415(b)(2) criteria for a removal and I recommend your approval of the selected removal action. Oversight costs will be recoverable from the AOC respondents. Estimated oversight costs are approximately $200,000. Oversight costs are fully recoverable, and should be recovered by the projected NTCRA AOC. Projected costs to implement this non-time-critical removal action are estimated not to exceed $5 million and will be paid by the AOL respondents.

Approved date Disapproved date

7/22/05

Acting Director/ECL

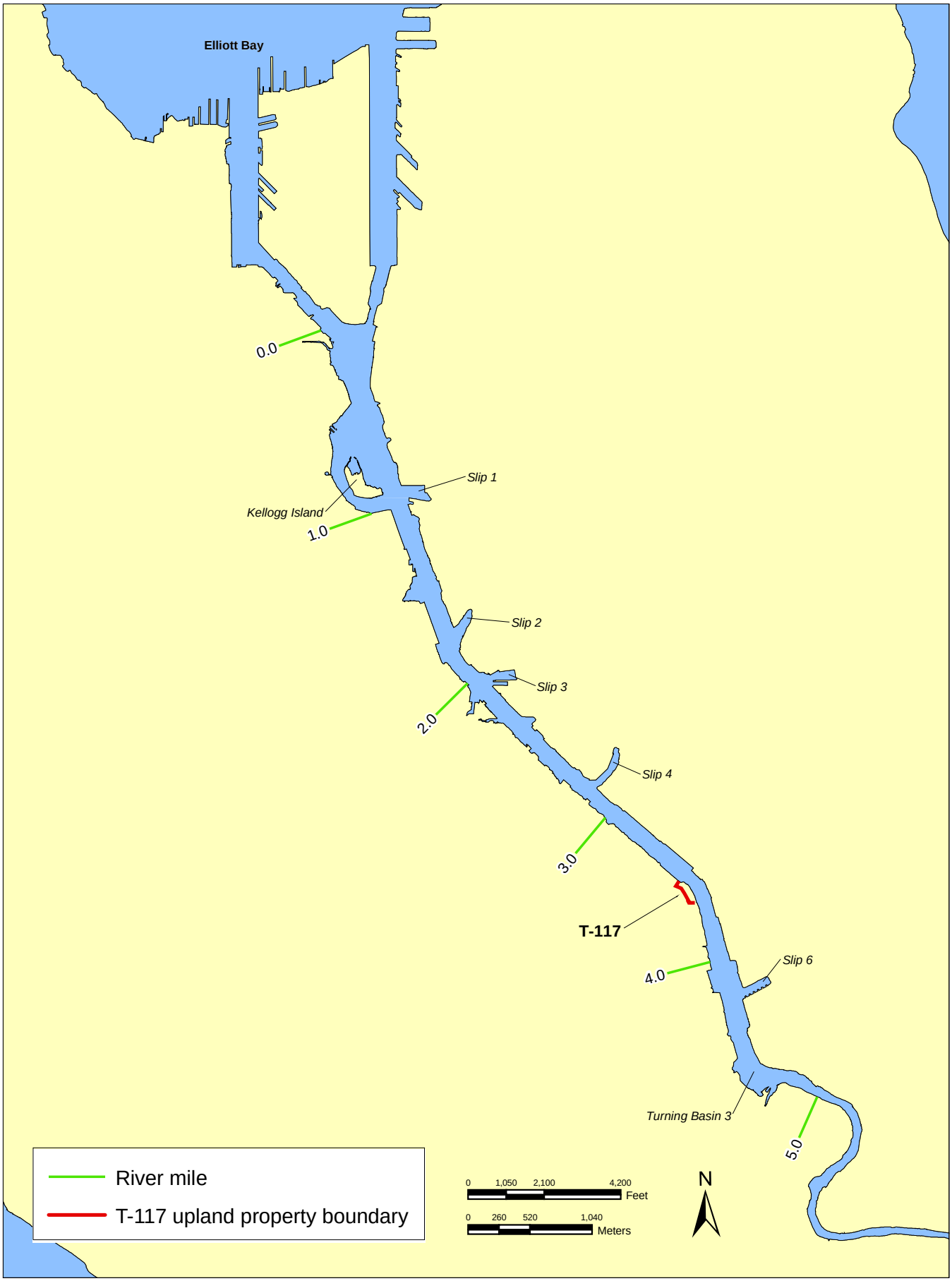
List of Figures, Tables, and Attachments

Figures

Tables

Attachments

Figures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Kellogg Island
1.0
Slip 2
Slip 3
2.0
Slip 4
3.0
T-117
Slip 6
4.0
Turning Basin 3
5.0
River mile
T-117 upland property boundary
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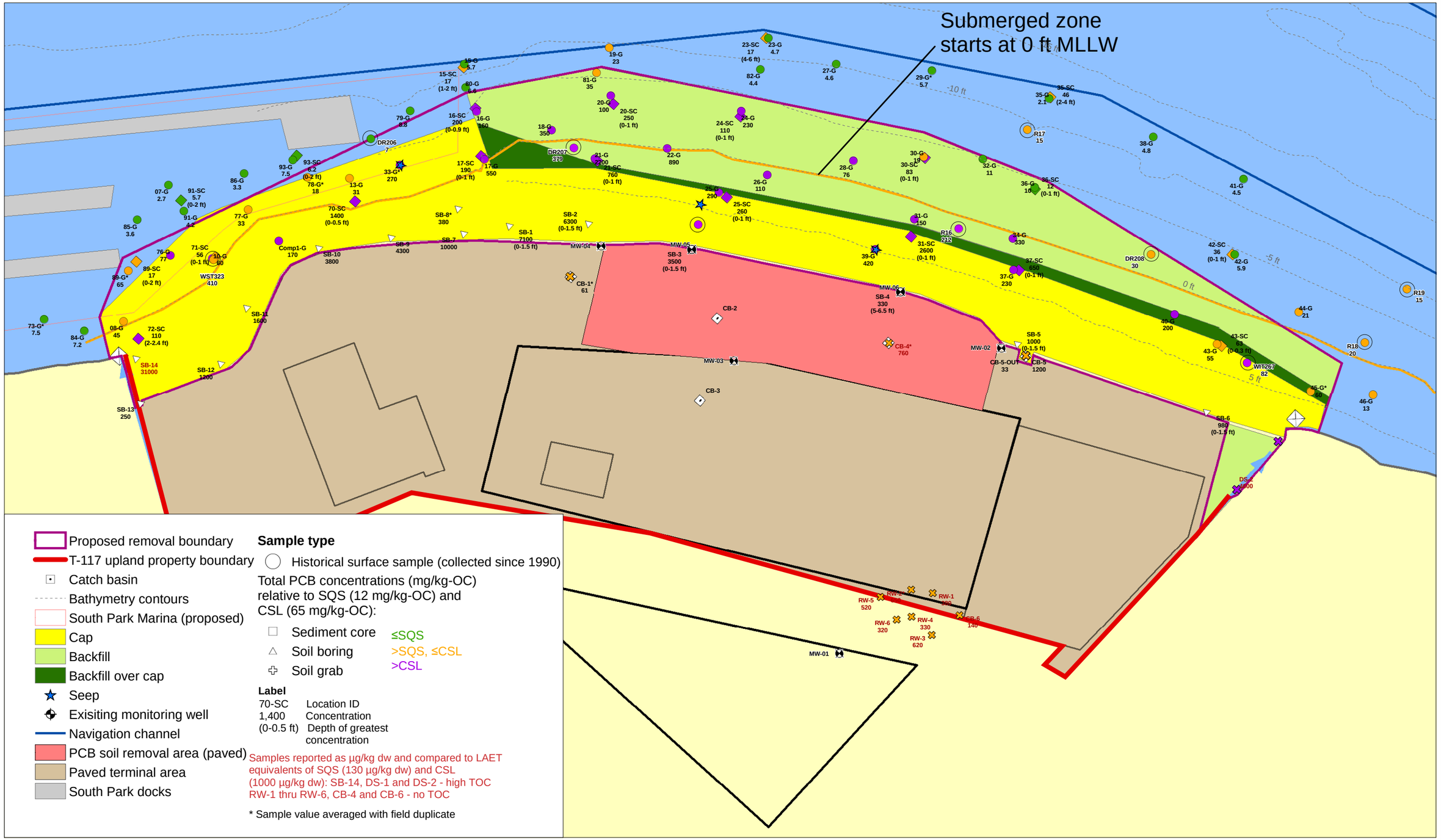
Feet
0 260 520 1,040
Meters
N



For sediment core and soil borings where more than one sample was collected (i.e., SB-1 or 20-SC), the maximum PCB concentration within the core or boring is shown. PCB concentrations for the other subsurface samples are in the report.

Wind Ward environmental LLC

Prepared by KH 07/14/05, from map 1609, Map 1908

W:\Projects\03-08-12 T-117 (Malarkey)\Data\GIS\EECA\Updated

Figure 2. Proposed Action

Tables

Table 1. Total PCBs in soil and sediment samples

SAMPLE ID	DEPTH BELOW SURFACE (ft)	TOTAL PCBS (mg/kg-OC)	SQS EF	CSL EF
Catch basin soil				
T-117-CB1-SU	0-0.5	**52**	4.3	0.80
T-117-CB1-SU-D[a]		***70***	5.8	1.1
T-117-CB4-01	0-0.5	**620**	4.8	0.62
T-117-CB4-02[a]		**890**	6.8	0.89
T-117-CB5	0-0.5	***1,200***	100	18
T-117-CB5-OUT		**33**	2.8	0.51
T-117-CB6-SU	0-0.5	**140**	1.1	0.14
Ditch soil				
T-117-DS1	0-0.5	***2,200***	17	2.2
T-117-DS1-D[a]	0-0.5	***1,600***	12	1.6
T-117-DS2	0-0.5	***4,600***	35	4.6
Shoreline bank soil				
T-117-SB1-01	0-1.5	***7,100***	590	110
T-117-SB1-02	2.5-4	***2,100***	180	32
T-117-SB1-03	5-6.5	1.4	0.12	0.022
T-117-SB1-04	7.5-9	***290***	24	4.5
T-117-SB1-05	10-11.5	3.7	0.31	0.057
T-117-SB1-06	12.5-14	<20	0.15	0.02
T-117-SB2-01	0-1.5	***6,300***	530	97
T-117-SB2-02	2.5-4	***4,800***	400	74
T-117-SB2-03	5-6.5	***920***	77	14
T-117-SB2-06	12.5-14	8.5	0.71	0.13
T-117-SB3-01	0-1.5	***3,500***	290	54
T-117-SB3-02	2.5-4	***3,200***	270	49
T-117-SB3-03	5-6.5	***670***	56	10
T-117-SB3-04	7.5-9	***680***	57	10
T-117-SB3-05	10-11.5	<5.6	0.47	0.086
T-117-SB3-06	12.5-14	<3.6	0.30	0.055
T-117-SB4-01	0-1.5	<2.4	0.20	0.037

SAMPLE ID	DEPTH BELOW SURFACE (ft)	TOTAL PCBS (mg/kg-OC)	SQS EF	CSL EF
T-117-SB4-02	2.5-4	<7.1	0.59	0.11
T-117-SB4-03	5-6.5	***330***	28	5.1
T-117-SB4-04	7.5-9	<1.8	0.15	0.028
T-117-SB4-05	10-11.5	16	0.12	0.016
T-117-SB4-06	12.5-14	<20	0.15	0.02
T-117-SB5-01	0-1.5	***500***	42	7.7
T-117-SB5-02	2.5-4	***1,000***	83	15
T-117-SB5-03	5-6.5	6.0	0.50	0.092
T-117-SB5-04	7.5-9	<2.2	0.18	0.034
T-117-SB5-05	10-11.5	**26**	2.2	0.40
T-117-SB5-06	12.5-14	**53**	4.4	0.82
T-117-SB6-01	0-1.5	***980***	82	15
T-117-SB6-02	2.5-4	7.6	0.63	0.12
T-117-SB6-03	5-6.5	<2.9	0.24	0.045
T-117-SB6-05	10-11.5	<3.6	0.30	0.055
T-117-SB6-06	12.5-14	<3.6	0.30	0.055
T-117-SB7-01	0-1.5	***10,000***	830	150
T-117-SB8-01	0-1.5	***380***	32	5.9
T-117-SB15-01[a]	0-1.5	***370***	31	5.6
T-117-SB9-01	0-1.5	***4,300***	360	67
T-117-SB10-01	0-1.5	***3,800***	320	59
T-117-SB11-01	0-1.5	***1,600***	130	24
T-117-SB12-01	0-1.5	***1,200***	96	18
T-117-SB13-01	0-1.5	***250***	21	3.8
T-117-SB14-01	0-1.5	31,000	240	31
Surface sediment				
T-117-SE07-SG	0-0.5	2.7	0.23	0.042
T-117-SE08-SG	0-0.5	**45**	3.8	0.70
T-117-SE10-SG	0-0.5	**60**	5.0	0.92
T-117-SE13-SG	0-0.5	**31**	2.6	0.48
T-117-SE15-SG	0-0.5	5.7	0.48	0.088
T-117-SE16-SG	0-0.5	***160***	13	2.4

SAMPLE ID	DEPTH BELOW SURFACE (ft)	TOTAL PCBS (mg/kg-OC)	SQS EF	CSL EF
T-117-SE17-SG	0-0.5	***550***	45	8.4
T-117-SE18-SG	0-0.5	***350***	29	5.3
T-117-SE19-SG	0-0.5	**23**	1.9	0.35
T-117-SE20-SG	0-0.5	***100***	8.3	1.5
T-117-SE21-SG	0-0.5	***2,200***	186	34
T-117-SE22-SG	0-0.5	***890***	74	14
T-117-SE23-SG	0-0.5	4.7	0.39	0.072
T-117-SE24-SG	0-0.5	***230***	19	3.6
T-117-SE25-SG	0-0.5	***290***	24	4.4
T-117-SE26-SG	0-0.5	***110***	9.3	1.7
T-117-SE27-SG	0-0.5	4.6	0.38	0.071
T-117-SE28-SG	0-0.5	***76***	6.3	1.2
T-117-SE29-SG	0-0.5	6.5	0.54	0.10
T-117-SE52-SG[a]	0-0.5	4.3	0.36	0.066
T-117-SE30-SG	0-0.5	**19**	1.6	0.29
T-117-SE31-SG	0-0.5	***150***	12	2.3
T-117-SE32-SG	0-0.5	11	0.95	0.17
T-117-SE33-SG	0-0.5	***310***	26	4.8
T-117-SE60-SG[a]	0-0.5	***130***	11	2.0
T-117-SE34-SG	0-0.5	***330***	27	5.0
T-117-SE35-SG	0-0.5	2.1	0.18	0.033
T-117-SE36-SG	0-0.5	10	0.87	0.16
T-117-SE37-SG	0-0.5	***230***	19	3.5
T-117-SE38-SG	0-0.5	4.8	0.40	0.074
T-117-SE39-SG	0-0.5	***420***	35	6.5
T-117-SE40-SG	0-0.5	***200***	17	3.1
T-117-SE41-SG	0-0.5	4.5	0.38	0.070
T-117-SE42-SG	0-0.5	5.9	0.49	0.091
T-117-SE43-SG	0-0.5	**55**	4.6	0.85
T-117-SE44-SG	0-0.5	**21**	1.8	0.33
T-117-SE45-SG	0-0.5	**43**	3.6	0.66
T-117-SE53-SG[a]	0-0.5	***83***	6.9	1.3
T-117-SE46-SG	0-0.5	**13**	1.1	0.20

SAMPLE ID	DEPTH BELOW SURFACE (ft)	TOTAL PCBs (mg/kg-OC)	SQS EF	CSL EF
T-117-SE-SGComp1	0-0.5	***170***	14	2.7
T-117-SE73-SG	0-0.5	8.0	0.66	0.12
T-117-SE75-SG[a]	0-0.5	7.0	0.58	0.11
T-117-SE74-SG	0-0.5	4.6	0.38	0.070
T-117-SE76-SG	0-0.5	***77***	6.4	1.2
T-117-SE77-SG	0-0.5	**40**	3.3	0.62
T-117-SE78-SG	0-0.5	**33**	2.8	0.51
T-117-SE83-SG[a]	0-0.5	9.2	0.77	0.14
T-117-SE79-SG	0-0.5	8.8	0.73	0.14
T-117-SE80-SG	0-0.5	6.6	0.55	0.10
T-117-SE81-SG	0-0.5	34	2.8	0.52
T-117-SE82-SG	0-0.5	4.4	0.37	0.068
T-117-SE84-SG	0-0.5	7.2	0.60	0.11
T-117-SE85-SG	0-0.5	3.6	0.30	0.055
T-117-SE86-SG	0-0.5	3.3	0.28	0.051
T-117-SE89-SG	0-0.5	***92***	7.7	1.4
T-117-SE95-SG[a]	0-0.5	48	4.0	0.75
T-117-SE91-SG	0-0.5	4.2	0.35	.065
T-117-SE93-SG	0-0.5	7.5	0.62	0.12

SQS – Sediment Quality Standard (12 mg/kg-OC) **bold** indicates SQS exceedance
CSL – Cleanup Screening Level (65 mg/kg-OC) ***bold and italicized*** indicates CSL exceedance
EF – exceedance factor (concentration divided by applicable SQS or CSL)
[a] Field duplicate
Shaded cell indicates the value is not OC normalized because %TOC is either ≤0.2 or ≥5.0%. Dry weight concentration compared to apparent effects threshold (AET) equivalents of SQS (lowest AET: 130 µg/kg dw) and CSL (second lowest AET: 1,000 µg/kg dw).

Table 2 - Detected metals and SVOCs exceeding SMS criteria in soil and sediment samples

SAMPLE ID	Chemical	RESULT	UNIT	SQS	CSL	SQS EF	CSL EF
Catch basin soil							
T-117-CB1-SU	Butyl benzyl phthalate	**44**	mg/kg-OC	4.9	64	9.0	0.69
	Pentachlorophenol	**480**	µg/kg dw	360	690	1.3	0.70
	Silver	***26.9***[a]	mg/kg dw	6.1	6.1	4.4	4.4
T-117-CB1-SU-D[b]	Butyl benzyl phthalate	**56**	mg/kg-OC	4.9	64	11	0.88
	Pentachlorophenol	***3,500***	µg/kg dw	360	690	9.7	5.1
	Silver	***27.6***	mg/kg dw	6.1	6.1	4.5	4.5
T-117-CB5	Bis(2-ethylhexyl)phthalate	***280***	mg/kg-OC	47	78	6.0	3.6
T-117-CB5-OUT	Benzyl alcohol	***87***	µg/kg dw	57	73	1.5	1.2
	Bis(2-ethylhexyl)phthalate	***150***	mg/kg-OC	47	78	3.2	1.9
	Butyl benzyl phthalate	**10**	mg/kg-OC	4.9	64	2.0	0.16
	Zinc	**664**[a]	mg/kg dw	410	960	1.6	0.69
Ditch soil							
T-117-DS1	Zinc	**454**	mg/kg dw	410	960	1.1	0.47
	Benzoic acid	***2,000***	µg/kg dw	650	650	3.1	3.1
	Benzyl alcohol	***860***	µg/kg dw	57	73	15	12
T-117-DS1-D[b]	Zinc	**430**	mg/kg dw	410	960	1.1	0.45
	Benzoic acid	***4,500***	µg/kg dw	650	650	6.9	6.9
	Benzyl alcohol	***1,000***	µg/kg dw	57	73	18	14
T-117-DS2	Benzoic acid	***1,300***	µg/kg dw	650	650	2.0	2.0
	Benzyl alcohol	***190***	µg/kg dw	57	73	3.3	2.6
Shoreline bank soil							
	Acenaphthylene	***100***	mg/kg-OC	66	66	1.5	1.5
	Benzo(a)anthracene	**180**	mg/kg-OC	110	270	1.6	0.67
	Benzo(a)pyrene	***320***	mg/kg-OC	99	210	3.2	1.5
	Benzo(g,h,i)perylene	***92***	mg/kg-OC	31	78	3.0	1.2

	Total Benzofluoranthenes	***760***	mg/kg-OC	230	450	3.3	1.7
	Chrysene	**330**	mg/kg-OC	100	460	3.3	0.72
	Dibenzo(a,h)anthracene	**33**	mg/kg-OC	12	33	2.8	1.0
	Dibenzofuran	**39**	mg/kg-OC	15	58	2.6	0.67
	Fluoranthene	**780**	mg/kg-OC	160	1,200	4.9	0.65
	Fluorene	**64**	mg/kg-OC	23	79	2.8	0.81
	Indeno(1,2,3-cd)pyrene	***100***	mg/kg-OC	34	88	2.9	1.1
	Phenanthrene	***750***	mg/kg-OC	100	480	7.5	1.6
	Total HPAH	**3,300**	mg/kg-OC	960	5,300	3.4	0.6
	Total LPAH	***1,100***	mg/kg-OC	370	780	3.0	1.4
T-117-SB3-02	Acenaphthene	**25**	mg/kg-OC	16	57	1.6	0.44
	Benzo(a)anthracene	**180**	mg/kg-OC	110	270	1.6	0.67
	Benzo(a)pyrene	**180**	mg/kg-OC	99	210	1.8	0.86
	Benzo(g,h,i)perylene	**83**	mg/kg-OC	31	78	2.7	1.1
	Total Benzofluoranthenes	**350**	mg/kg-OC	230	450	1.5	0.78
	Chrysene	**220**	mg/kg-OC	100	460	2.2	0.48
	Dibenzo(a,h)anthracene	**32**	mg/kg-OC	12	33	2.7	1.0
	Fluoranthene	**440**	mg/kg-OC	160	1,200	2.8	0.37
	Indeno(1,2,3-cd)pyrene	**88**	mg/kg-OC	34	88	2.6	1.0
	Phenanthrene	**280**	mg/kg-OC	100	480	2.8	0.58

	Total HPAH	**1,900**	mg/kg-OC	960	5,300	2.0	0.36
	Total LPAH	**430**	mg/kg-OC	370	780	1.2	0.55
Surface sediment	Indeno(1,2,3-cd)pyrene	**37**	mg/kg-OC	34	88	1.1	0.42
T-117-SE25-SG	Acenaphthene	**18**	mg/kg-OC	16	57	1.1	0.31
	Phenanthrene	**140**	mg/kg-OC	100	480	1.4	0.29
	2-Methylnaphthalene	***74***	mg/kg-OC	38	64	1.9	1.2
T-117-SE37-SG	Acenaphthene	***210***	mg/kg-OC	16	57	13	3.7
	Anthracene	**230**	mg/kg-OC	220	1,200	1.0	0.19
	Benzo(a)anthracene	***440***	mg/kg-OC	110	270	4.0	1.6
	Benzo(a)pyrene	***420***	mg/kg-OC	99	210	4.2	2.0
	Benzo(g,h,i)perylene	**63**	mg/kg-OC	31	78	2.0	0.81
	Chrysene	**410**	mg/kg-OC	100	460	4.1	0.89
	Dibenzo(a,h)anthracene	***34***	mg/kg-OC	12	33	2.8	1.0
	Dibenzofuran	***220***	mg/kg-OC	15	58	15	3.8
	Fluoranthene	***1,260***	mg/kg-OC	160	1,200	7.9	1.1
	Fluorene	***290***	mg/kg-OC	23	79	13	3.7
	Indeno(1,2,3-cd)pyrene	***100***	mg/kg-OC	34	88	2.9	1.1
	Phenanthrene	***1,500***	mg/kg-OC	100	480	15	3.1
	Total HPAHs	**4,500**	mg/kg-OC	960	5,300	4.7	0.8
	Total LPAHs	***2,300***	mg/kg-OC	370	780	6.2	2.9

SQS – Sediment Quality Standard **bold** indicates SQS exceedance
CSL – Cleanup Screening Level ***bold and italicized*** indicates CSL exceedance
EF – exceedance factor (concentration divided by applicable SQS or CSL)
[a] Result averaged with laboratory duplicate
[b] Field duplicate

Table 3. Comparative analysis of Alternative 1 and Alternative 2

COMPONENT	ALTERNATIVE 1	ALTERNATIVE 2
Volume removed	1,500 cy upland north 1,000 cy upland south 3,000 cy bank 2,000 cy mudflat 5,500 cy submerged **13,000 cy total**	1,500 cy upland north 1,000 cy upland south 3,000 cy bank 1,500 cy mudflat 2,000 cy submerged **9,000 cy total**
Volume capping/backfill	10,500 cy	10,000 cy
PCB concentration of removed material	70-75 mg/kg dw upland north 15-20 mg/kg dw upland south 5-10 mg/kg dw bank 5-10 mg/kg dw mudflat 1-2 mg/kg dw submerged	70-75 mg/kg dw upland north 15-20 mg/kg dw upland south 5-10 mg/kg dw bank 5-10 mg/kg dw mudflat <1 mg/kg dw submerged
PCBs removed, lbs[a]	~380 upland/bank ~30 mudflat ~20 submerged **~430 total**	~380 upland/bank ~20 mudflat ~2 submerged **~400 total**
Protection of human health and environment	protective	protective
Achievement of RAOs	achieved	achieved
ARARs	Complies with ARARs. Surface sediment PCB concentrations will be below the SQS following the removal action. No net loss of aquatic habitat, with no significant change of the mudflat/submerged contours. Limited in-water work for dredging and for upland-based excavation at and near elevation 0 ft MLLW. Landfill disposal complies with federal and state regulations.	Complies with ARARs Surface sediment PCB concentrations will be below the SQS following the removal action. No net loss of aquatic habitat, with the cap raising the bed of the mudflat and submerged zone about 3 ft. This will result in upward shifts in the bed between approximately elevation 0 and -5 ft MLLW. Limited in-water work for dredging. Landfill disposal complies with federal and state regulations.

COMPONENT	ALTERNATIVE 1	ALTERNATIVE 2
Long-term effectiveness and permanence	Effective and permanent. Removes 430 lbs of PCBs. Upland/bank cap requires long-term monitoring and maintenance.	Effective and permanent. Removes 400 lbs of PCBs. Upland/bank/mudflat/submerged cap requires long-term monitoring and maintenance. Capping area of Alternative 2 is approximately 30% larger than for Alternative 1.
Short-term effectiveness	Highest concentrations of PCBs, found in the upland, are excavated totally in the dry above high water, greatly reducing the short-term potential for PCB release to the LDW. Upland/bank/mudflat excavations are completed from upland to reduce potential risk of PCB release to LDW. Alternative 1 involves some upland-based excavation in the water close to the existing 0 ft MLLW contour. Alternative 1 involves 5,500 cy of submerged zone dredging. Short-term impacts to water quality would be managed through engineering controls and BMPs.	Highest concentrations of PCBs, found in the Upland, are excavated totally in the dry above high water, greatly reducing the short-term potential for PCB release to the LDW. Upland/bank/mudflat excavations completed from upland to reduce potential risk of PCB release to LDW. Alternative 2 does not involve upland-based excavation in the water since upland excavation will not go deeper than 0 ft MLLW contour. Alternative 2 involves 2,000 cy of submerged zone dredging, about 35% of the Alternative 1 dredging. Short-term impacts to water quality would be of slightly shorter duration as compared to Alternative 1.

COMPONENT	ALTERNATIVE 1	ALTERNATIVE 2
Implementability	Upland/bank/mudflat work is best completed in May through August when very low tides occur. Alternative 1 involves some upland-based excavation in the water at the existing 0 ft MLLW contour (2 ft deep to elevation -2 ft MLLW) which is more difficult to implement than Alternative 2. Work is completed with conventional upland and waterway-based equipment. The work will be completed on land owned or controlled by the Port. No easements or rights-of-way are anticipated for the work. There are no apparent impediments to imposing deed restrictions to provide long-term protection of the capped area because all of the affected land is controlled by the Port. Institutional controls are required to protect the cap, including deed restrictions if the property is sold	Upland/bank/mudflat work is best completed in May through August when very low tides occur. Alternative 2 does not involve any upland-based removal below elevation 0 ft MLLW, which is easier to implement than Alternative 1. Work is completed with conventional upland and waterway-based equipment. Since Alternative 2 involves Mudflat and submerged zone capping that will result in a slight decrease of the cross-sectional area of the LDW. The work will be completed on land owned or controlled by the Port. No easements or rights-of-way are anticipated for the work. There are no apparent impediments to imposing deed restrictions to provide long-term protection of the capped area because all of the affected land is controlled by the Port. Institutional controls are required to protect the cap, including deed restrictions if the property is sold
Cost	**$3,350,000**	**$3,100,000**

Table 4. Applicable or relevant and appropriate requirements

SOURCE	REQUIREMENT
Washington State Model Toxics Control Act WAC 173-340-440	These regulations are applicable to establishing institutional controls for capping and for selecting cleanup actions. The removal would comply with these requirements by implementing appropriate institutional controls in capped areas administered by the Port.
Federal Water Pollution Control Act/ Clean Water Act (CWA) 33 USC 1251-1376 40 CFR 100-149	Established the basic structure for regulating discharges of pollutants into the waters of the United States. Section 404 regulates the discharge of dredged material or fill into navigable waters. Section 401 requires water quality certification for such activities. The removal action will comply with these regulations through the implementation of best management practices and a water quality monitoring program.
Washington State Water Quality Standards for Surface Waters WAC 173-201A	Standards for the protection of surface water quality have been established in Washington State. Acute marine criteria are anticipated to be relevant and appropriate requirements for discharge to marine surface water during sediment dredging. The removal action will comply with these regulations through the implementation of best management practices and a water quality monitoring program.
Washington State Sediment Management Standards WAC 173-204	Chemical concentration and biological effects standards are established for Puget Sound sediments and are applicable to both alternatives. Within the removal boundary, total PCB concentrations in sediment will be well below the SQS for both alternatives because of the use of clean capping material.
Construction in State Waters, Hydraulic Code Rules RCW 75.20 WAC 220-110	Hydraulic project approval and associated requirements for construction projects in state waters have been established for the protection of fish and shellfish. The removal action will comply with the substantive requirements of these regulations by implementing best management practices for the protection of fish and shellfish, as recommended by the Washington Department of Fish and Wildlife.
Toxic Substances Control Act (TSCA) 40 CFR 761	This regulation pertains to upland remediation PCB waste. The removal action will comply with TSCA because all soils and sediments with total PCB concentrations greater than 50 mg/kg dw will be designated for disposal at a TSCA landfill.

SOURCE	REQUIREMENT
Federal Endangered Species Act of 1973 16 USC 1531 et seq. 50 CFR 200 50 CFR 402	This regulation is applicable to any actions performed at this site as this area is potential habitat for threatened and/or endangered species. A biological assessment will be conducted in conjunction with the removal design documents in consultation with NOAA Fisheries (NMFS) and USFWS. The removal action will comply with the substantive requirements of the Act by implementing best management practices for the protection of fish and shellfish, as recommended by NMFS and USFWS.
Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act 50 CFR 600	Identifies and protects important habitats of federally managed marine and anadromous fish species in consultation with NMFS regarding the potential effects of the action on EFH. The removal action will comply with the requirements of the Act by implementing best management practices for the protection of EFH, as recommended by NMFS, and respond in writing to NMFS's recommendations.
US Fish and Wildlife Coordination Act. 16 USC 661-667(e)	Prohibits water pollution with any substance deleterious to fish, plant life, or bird life. The US Fish and Wildlife Service and appropriate state agencies will be consulted to ascertain the means and measures necessary to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources.
Migratory Bird Treaty Act 16 USC 703-712	Governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests. Action will be taken to protect habitat for migratory birds
Rivers and Harbors Appropriations Act 33 USC 403 33 CFR 322	Section 10 of this act establishes permit requirements for activities that may obstruct or alter a navigable waterway. Activities that could impede navigation and commerce are prohibited. These substantive permit requirements are anticipated to be applicable to actions such as dredging, which may affect the navigable portions of the waterway.
Solid Waste Handling Standards WAC 173-350	Applicable to the disposal of non-hazardous waste generated during removal activities. These standards set minimum functional performance standards for the proper handling and disposal of solid waste, identifies functions necessary to assure effective solid waste handling programs at both the state and local level, and follows priorities for the management of solid waste as set by the legislature in chapter 70.95 RCW, Solid waste management -- reduction and recycling.
Washington Dangerous Waste Regulations WAC 173-303	The state RCRA program regulations which operate in lieu of the federal RCRA program in Washington, and contain a series of rules that are applicable to the generation, handling, storage and disposal of dangerous waste.

SOURCE	REQUIREMENT
Native American Graves Protection and Repatriation Act 25 USC 3001 et seq.; 43 CFR Part 10	Excavation must cease if Native American burials or cultural items are inadvertently discovered
American Indian Religious Freedom Act 42 USC 1996 et seq.	Work must stop if sacred religious sites are discovered
National Historic Preservation Act 16 USC 470(f); 36 CFR Parts 60, 63, and 800	The removal action must be evaluated to avoid, minimize, or mitigate the impact on historic sites or structures if discovered
Archaeological Resources Protection Act 16 USC 470 et seq.; 43 CFR Part 7	Removal of archaeological resources is prohibited without a permit.
Shorelines Management KCC Title 25	Regulates all building, excavation, dredging, and filling within 200 feet of regulated shorelines. Any illegal fill placed after 1972 must be removed.
Critical Areas KCC Title 21A.24	State law (the Growth Management Act) requires local governments to develop regulations to protect critical areas, but the content of these regulations is left to local government discretion, and these ordinances are not subject to state approval. These will be addressed as To Be Considered (TBCs) for CERCLA purposes.

Table 5. Alternative 1 cost estimate

TASK	COST
Mobilization	$200,000
Upland/bank excavation and demolition	$200,000
Mudflat excavation	$50,000
Submerged dredging and marine demolition/construction	$250,000
Capping from upland	$200,000
Capping from waterway	$150,000
WSST estimate	$100,000
Disposal	$1,150,000
Contingency (~25%)	$500,000
Removal action oversight (~15%)	$400,000
Long-term monitoring and maintenance, present value[a]	$150,000
Total estimated cost	$3,350,000

[a] - Long-term monitoring costs based on six events at $15,000 each over ten years. Maintenance costs assumed to have a present value of 1/3 the construction cost of the cap, or about $65,000.